

WHAT IS CLAIMED IS:

1 1. An intravascular balloon catheter comprising:
2 a catheter body having a proximal end, a distal end, and a guidewire lumen
3 therebetween; and
4 a first balloon structure having a passage which is slidably receivable over the
5 catheter body.

1 2. An intravascular balloon catheter comprising:
2 a catheter body having a proximal end, a distal end, and a guidewire lumen
3 therebetween; and
4 a first balloon structure having a passage for slidably receiving the catheter
5 body.

1 3. An intravascular catheter comprising:
2 a catheter body having a proximal end, a distal end, and a guidewire lumen
3 therebetween; and
4 a tubular structure having a self-expandable prosthesis thereon and a passage
5 for slidably receiving the catheter body.

1 4. An intravascular balloon catheter as in Claim 3, wherein the self-
2 expandable prosthesis is a stent.

1 5. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 catheter body comprises an axially collapsible elongate member.

1 6. An intravascular balloon catheter as in Claim 5, wherein the axially
2 collapsible elongate member is of a telescopic construction.

1 7. An intravascular balloon catheter as in Claim 5, wherein the axially
2 collapsible elongate member is of a convoluted construction.

1 8. An intravascular balloon catheter as in Claim 5, 6, or 7, wherein the
2 axially collapsible elongate member is affixed to the passage.

1 9. An intravascular balloon catheter as in Claim 8, wherein the axially
2 collapsible elongate member is affixed to the exterior of the passage.

1 10. An intravascular balloon catheter as in Claim 8, wherein the axially
2 collapsible elongate member is affixed to the interior of the passage.

1 11. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 catheter body comprises a tubular member having at least one lumen.

1 12. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein a
2 perimeter of the catheter body has a circular, oblong, or elliptical shape.

1 13. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 distal end of the catheter body is axially tapered for a length of at least 3 mm.

1 14. An intravascular balloon catheter as in Claim 13, wherein the distal
2 end of the catheter body is axially tapered for a length of at least 0.5 mm.

1 15. An intravascular balloon catheter as in Claim 14, wherein the distal
2 end of the catheter body is axially tapered for a length of at least 0.1 mm.

1 16. An intravascular balloon catheter as in Claim 1, 2, or 3, further
2 comprising an atraumatic tip at the distal end of the catheter body.

1 17. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 balloon structure distal end is distally tapered.

1 18. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 catheter body is formed at least in part from a polymer material, a composite material, a
3 braided material, a metal material, or a metal alloy.

1 19. An intravascular balloon catheter as in Claim 18, wherein the catheter
2 body is formed from a polymer material, a composite material, a braided material, or a metal
3 material.

1 20. An intravascular balloon catheter as in Claim 18, wherein the metal
2 alloy comprises a nickel titanium alloy.

1 21. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 catheter body comprises multiple tubular members coupled to one another.

1 22. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 balloon structure comprises a shaft including an inflation lumen extending at least along a
3 portion thereof.

1 23. An intravascular balloon catheter as in Claim 22, wherein the shaft has
2 sufficient column strength to advance the balloon structure over the catheter body.

1 24. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 balloon structure comprises an inflation tube extending proximally from the balloon when the
3 balloon is disposed near the distal end of the catheter body.

1 25. An intravascular balloon catheter as in Claim 24, wherein the inflation
2 tube has sufficient column strength to advance the balloon structure over the catheter body.

1 26. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 balloon structure comprises a distal section having an inflatable member disposed thereat,
3 and a lumen comprising an inflation lumen extending proximally from the inflatable member.

1 27. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 balloon structure comprises a distal section having an inflatable member disposed thereat,
3 and the passage at least in part extends proximally from the inflatable member.

1 28. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 balloon structure comprises a distal section having an inflatable member disposed thereat,
3 and the passage at least in part extends distally from the inflatable member.

1 29. An intravascular balloon catheter as in Claim 22, 23, 24, 25 or 26,
2 wherein an axial groove is formed over at least a portion of the length of the inflation tube to
3 removably receive at least a portion of the catheter body.

1 30. An intravascular balloon catheter as in Claim 22, 23, 24, 25 or 26,
2 wherein an axial groove is formed over at least a portion of the length of the inflation tube to
3 removably receive at least a portion of the catheter body.

1 31. An intravascular balloon catheter as in Claim 30, wherein the groove
2 has a length in the range from 10 cm to 150 cm and an opening in the range from 0.001
3 inches to 0.014 inches.

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1 42. An intravascular balloon catheter as in Claim 40, wherein the slit
2 comprises multiple slits.

1 43. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 catheter body includes apertures along at least a portion of the length of the guidewire lumen
3 fluidically connecting the guidewire lumen to the exterior of the catheter body.

1 44. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein an
2 axial slit is formed over at least a portion of the length of the catheter body to removably
3 receive an inflation tube of the balloon structure.

1 45. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 catheter body has a length in the range from 50 cm to 200 cm, and outer diameter in the range
3 from 1 F to 10 F, and a guidewire lumen diameter in the range from 0.2 mm to 2 mm.

1 46. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 balloon structure, further comprises a sleeve having an inflatable balloon disposed over an
3 outer surface of the sleeve, wherein the passage is formed axially in the sleeve.

1 47. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 balloon structure, further comprises a sleeve having an inflatable balloon disposed over at
3 least a portion thereof, wherein the passage is an axial passage distal to a balloon chamber.

1 48. An intravascular balloon catheter as in Claim 46, wherein the sleeve
2 has a length in the range from 3 cm to 50 cm and the inflatable balloon has a length in the
3 range from 1 cm to 5 cm.

1 49. An intravascular balloon catheter as in Claim 46, wherein at least a
2 portion of the sleeve is slidably receivable over the catheter body.

1 50. An intravascular balloon catheter as in Claim 1, 2, 3, 36, 37, or 39,
2 further comprising a deployable embolic capture element on the catheter body.

1 51. An intravascular balloon catheter as in Claim 50, wherein the
2 deployable embolic capture element is located within 20 cm of the distal end of the catheter
3 body.

1 52. An intravascular balloon catheter as in Claim 50, wherein catheter
2 body embolic capture element is configured for depolyment as it is disposed distal to a
3 balloon strucutre distal tip.

1 53. An intravascular balloon catheter as in Claim 52, wherein a portion of
2 the catheter body including the embolic capture element is disposed distal to the distal tip of
3 the balloon structure by retracting the balloon structure proximally.

1 54. An intravascular balloon catheter as in Claim 52, wherein a portion of
2 the catheter body including the embolic capture element is disposed distal to the distal tip of
3 the balloon structure by advancing the distal tip of the catheter body distal to the balloon
4 structure distal tip.

1 55. An intravascular balloon catheter as in Claim 50, wherein the balloon
2 structure further includes a retractable sleeve having a distal tip, and the catheter embolic
3 capture element is configured for deployment as a portion of the catheter body including the
4 embolic capture element is disposed distal to the distal tip of the retractable sleeve.

1 56. An intravascular balloon catheter as in Claim 55, wherein the portion
2 of the catheter body including the embolic capture element is disposed distal to the distal tip
3 of the balloon structure by retracting the retractable sleeve proximally from the catheter body
4 portion.

1 57. An intravascular balloon catheter as in Claim 56, wherein the portion
2 of the catheter body including the embolic capture element is disposed distal to the distal tip
3 of the retractable sleeve by advancing the distal tip of the catheter body distal to the
4 retractable sleeve distal tip.

1 58. An intravascular balloon catheter as in Claim 1, 2, 3, 36, 37, or 39,
2 further comprising a deployable embolic capture element on the first balloon structure.

1 59. An intravascular balloon catheter as in Claim 1, 2, 3, 36, 37, or 39,
2 further comprising a second balloon on the catheter body.

1 60. An intravascular balloon catheter as in Claim 59, further comprising an
2 expandable vascular prostheses disposed over the second balloon.

1 61. An intravascular balloon catheter as in Claim 1, 2, 3, 36, 37, or 39,
2 further comprising a self-expanding prosthesis on the catheter body.

1 62. An intravascular balloon catheter as in Claim 61, wherein the
2 prosthesis in an unexpanded state is distal to the balloon structure.

1 63. An intravascular balloon catheter as in Claim 62, wherein the balloon
2 structure further comprises a retractable sleeve configured to keep the prosthesis in an
3 unexpanded state until the sleeve is retracted proximally away from the prosthesis.

1 64. An intravascular balloon catheter as in Claim 61, wherein the
2 prosthesis in unexpanded state is at least partially under the balloon structure.

1 65. An intravascular balloon catheter as in Claim 1, 2, 3, 36, 37, or 39,
2 further comprising an atherectomy element coupled to a distal section of the catheter body.

1 66. An intravascular balloon catheter as in Claim 1, 2, 3, 36, 37, or 39,
2 further comprising at least one pressure sensor coupled to a distal section of the catheter
3 body.

1 67. An intravascular balloon catheter as in Claim 1, 2, 3, 36, 37, or 39,
2 further comprising at least one infusion port at a distal section of the catheter body.

1 68. An intravascular balloon catheter as in Claim 1, 2, or 3, further
2 comprising a second catheter body having a passage which is slidably receivable over the
3 catheter body.

1 69. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 guidewire lumen extends from the catheter body proximal end to a distal tip at the catheter
3 body distal end.

1 70. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 catheter body is formed at least in part from a polymer material, a composite material, a
3 braided material, a metal material, or mixtures or combinations thereof.

1 71. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 catheter body comprises multiple tubular members fluidically connectable to one another.

1 72. An intravascular balloon catheter as in Claim 26, wherein the balloon
2 structure includes an axial groove along at least a portion thereof for slidably receiving at
3 least a portion of the catheter body.

1 73. An intravascular balloon catheter as in Claim 72, wherein the groove is
2 a single continuous groove.

1 74. An intravascular balloon catheter as in Claim 72, wherein the groove
2 includes multiple intermittent grooves.

1 75. An intravascular balloon catheter as in Claim 26, wherein the catheter
2 body includes an axial groove along at least a portion thereof for slidably receiving at least a
3 portion of the balloon structure.

1 76. An intravascular balloon catheter as in Claim 72 or 75, wherein the
2 groove includes transverse ends.

1 77. An intravascular balloon catheter as in Claim 76, wherein the groove
2 transverse ends are abutting.

1 78. An intravascular balloon catheter as in Claim 76, wherein the groove
2 transverse ends overlap.

1 79. An intravascular balloon catheter as in Claim 72 or 75, wherein the
2 groove has a length in the range from about 1 cm to about 200 cm.

1 80. An intravascular balloon catheter as in Claim 79, wherein the groove
2 has a length in the range from about 1 cm to about 150 cm.

1 81. An intravascular balloon catheter as in Claim 80, wherein the groove
2 has a length in the range from about 10 cm to about 150 cm.

1 82. An intravascular balloon catheter as in Claim 76, wherein the groove
2 has an opening formed between the transverse ends in the range from 0.001 inches to 0.1
3 inches.

1 83. An intravascular balloon catheter as in Claim 82, wherein the groove
2 has an opening formed between the transverse ends in the range from 0.001 inches to 0.014
3 inches.

1 84. An intravascular balloon catheter as in Claim 72 or 75, wherein the
2 groove has an inner diameter in the range of about 0.0145 to 0.03 inches.

1 85. An intravascular balloon catheter as in Claim 84, wherein the groove
2 has an inner diameter in the range of about 0.016 to 0.02 inches.

1 86. An intravascular balloon catheter as in Claim 1 or 26, wherein the
2 catheter body includes an axial slit extending along at least a portion thereof for slidably
3 receiving at least a portion of a guidewire therein.

1 87. An intravascular balloon catheter as in Claim 1 or 26, wherein at least
2 a portion of the length of the catheter body includes an axial slit for slidably receiving at least
3 a portion of the balloon structure.

1 88. An intravascular balloon catheter as in Claim 86, wherein a length of
2 the slit ranges from about 0.5 to about 200 cm.

1 89. An intravascular balloon catheter as in Claim 86, wherein the slit is a
2 single slit.

1 90. An intravascular balloon catheter as in Claim 86, wherein the slit
2 includes multiple intermittent slits.

1 91. An intravascular balloon catheter as in Claim 1, 2, or 3 wherein the
2 balloon structure, further comprises a sleeve forming at least in part the passage.

1 92. An intravascular balloon catheter as in Claim 91, further comprising a
2 deployable embolic capture element on the sleeve.

1 93. An intravascular balloon catheter as in Claim 50 or 51, wherein the
2 embolic capture element includes a filter having pores with a size ranging from about 1 to
3 about 200 microns.

1 94. An intravascular balloon catheter as in Claim 93, wherein the embolic
2 capture element includes a filter having pores with a size ranging from about 1 to about 100
3 microns.

1 95. An intravascular balloon catheter as in Claim 50 or 51, wherein the
2 embolic capture element includes a filter configured to be opened and/or closed by the axial
3 or radial movement of the inflatable balloon structure or the catheter body.

1 96. An intravascular balloon catheter as in Claim 61, wherein the
2 prosthesis in an unexpanded state is at least partially under the balloon structure in an
3 unexpanded state.

1 97. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 catheter body distal end includes a distal tip configured to be slidably disposable distal to a
3 distal tip of the balloon structure.

1 98. An intravascular balloon catheter as in Claim 26, wherein the balloon
2 structure distal portion lumen includes multiple lumens.

1 99. An intravascular balloon catheter as in Claim 1, 2, or 3, wherein the
2 balloon structure comprises multiple lumens in a distal portion of the structure.

1 100. An intravascular balloon catheter as in Claim

1 91 wherein the sleeve forming the passage includes multiple lumens along at
2 least a portion thereof.

1 101. An intravascular balloon catheter as in Claim 72, wherein the axial
2 groove is, further configured to removably receive at least a portion of the catheter body.

1 102. An intravascular balloon catheter as in Claim 75, wherein the axial
2 groove is, further configured to removably receive at least a portion of the balloon structure.

1 103. An intravascular balloon catheter as in Claim 24 or 26, wherein an
2 axial groove is formed over at least a portion of the length of the inflation tube to slidably
3 receive at least a portion of the catheter body.

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1 113. A method as in Claim 110, wherein expanding the balloon structure
2 comprises introducing an inflation medium through an inflation lumen in the catheter body.

1 114. A method for withdrawal of a balloon structure over a catheter body,
2 the method comprising:
3 withdrawing the balloon structure over the catheter body in a proximal
4 direction, wherein the catheter body remains in place over a guidewire in a blood vessel.

1 115. A method for withdrawal of a balloon structure over a catheter body,
2 the method comprising:
3 withdrawing the balloon structure from an intracorporeal lumen over the
4 catheter body in a proximal direction; and
5 maintaining the catheter body within the corporeal lumen over a guidewire
6 placed in the intracorporeal lumen.

1 116. A method for balloon introduction over a catheter body, comprising:
2 introducing a first balloon structure over the catheter body in a distal direction,
3 wherein the catheter body remains in place over a guidewire in a blood vessel.

1 117. A method introduction of a balloon structure to an intracorporeal body
2 over a catheter body, comprising:
3 introducing the balloon structure over the catheter body in a distal direction;
4 and
5 maintaining the catheter body within the corporeal lumen over a guidewire
6 placed in the intracorporeal lumen.

1 118. A method for balloon catheter exchange over a catheter body,
2 comprising:
3 withdrawing a first balloon structure from an intracorporeal lumen over the
4 catheter body in a proximal direction;
5 maintaining the catheter body within the intracorporeal lumen; and
6 introducing a second balloon structure to the intracorporeal lumen over the
7 catheter body in a distal direction.

119. A method for balloon catheter exchange over a catheter body as in Claim 118, wherein the maintaining step includes maintaining the catheter body within the intracorporeal lumen over a guidewire in the intracorporeal lumen.

120. A method for introduction of an intracorporeal device to an intracorporeal body, comprising:
 introducing a first device to an intracorporeal body over a catheter body in a distal direction;
 performing a diagnostic or therapeutic act using the first device;
 withdrawing the first device from the intracorporeal body in a proximal direction;
 maintaining the catheter body within the intracorporeal lumen.

121. A method for introduction of an intracorporeal device to an intracorporeal body as in Claim 120, further comprising:
 introducing a second device to the intracorporeal body over the catheter body in a distal direction.

122. A method for introduction of an intracorporeal device to an intracorporeal body as in Claim 121, further comprising:
 maintaining the catheter body within the intracorporeal lumen.

123. A method for introduction of an intracorporeal device to an intracorporeal body, comprising:
 introducing at least a portion of a device to the intracorporeal body in a distal direction, the device comprising a catheter body and a first structure having a passage for slidably receiving the catheter body;
 performing a diagnostic or therapeutic procedure using the first structure;
 withdrawing the first structure from the intracorporeal body in a proximal direction over the catheter body;
 maintaining the catheter body within the intracorporeal lumen.

124. A method for introduction of an intracorporeal device to an intracorporeal body as in Claim 123, further comprising:

3 introducing a second structure to the intracorporeal body over the catheter
4 body in a distal direction.

1 125. A method for introduction of an intracorporeal device to an
2 intracorporeal body as in Claim 124, further comprising:
3 maintaining the catheter body within the intracorporeal lumen.

1 126. A method for introduction of an intracorporeal device to an
2 intracorporeal body as in Claim 124 or 125, further comprising:
3 performing a diagnostic or therapeutic act using the second structure.

1 127. A method for introduction of an intracorporeal device to an
2 intracorporeal body as in Claim 124 or 125, wherein first structure includes a dilatation
3 balloon and the diagnostic or therapeutic act using the first structure comprises dilatation of a
4 vessel.

1 128. A method for introduction of an intracorporeal device to an
2 intracorporeal body as in Claim 127, wherein the second structure includes a expandable
3 prosthesis and the diagnostic or therapeutic act using the second structure comprises
4 expanding the prosthesis within the vessel.

1 129. A method for introduction of an intracorporeal device to an
2 intracorporeal body as in Claim 123, wherein the catheter body and the first structure are
3 introduced together to the intracorporeal body.

1 130. A method for introduction of an intracorporeal device to an
2 intracorporeal body as in Claim 123, wherein in the catheter body is at least partially
3 introduced to the intracorporeal body before the first structure.

1 131. A method for introduction of an intracorporeal device to an
2 intracorporeal body as in Claim 123, wherein the first structure is at least partially introduced
3 to the intracorporeal body before the catheter body.

1 132. An intravascular balloon catheter receivable over an elongate body,
2 comprising:
3 a first balloon structure having proximal and distal sections and including a
4 shaft having an inflation lumen extending at least along a portion thereof;

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1 143. An intravascular balloon catheter as in Claim 132, wherein the groove
2 includes multiple intermittent grooves.

1 144. An intravascular balloon catheter as in Claim 132, wherein the groove
2 includes transverse ends.

1 145. An intravascular balloon catheter as in Claim 144, wherein the groove
2 transverse ends are abutting.

1 146. An intravascular balloon catheter as in Claim 144, wherein the groove
2 transverse ends overlap.

1 147. An intravascular balloon catheter as in Claim 144, wherein the groove
2 has a length in the range from about 1 cm to about 200 cm.

1 148. An intravascular balloon catheter as in Claim 144, wherein the groove
2 has a length in the range from about 1 cm to about 150 cm.

1 149. An intravascular balloon catheter as in Claim 144, wherein the groove
2 has a length in the range from about 10 cm to about 150 cm.

1 150. An intravascular balloon catheter as in Claim 144, wherein the groove
2 has an opening formed between the transverse ends in the range from 0.001 inches to 0.1
3 inches.

1 151. An intravascular balloon catheter as in Claim 144, wherein the groove
2 has an opening formed between the transverse ends in the range from 0.001 inches to 0.014
3 inches.

1 152. An intravascular balloon catheter as in Claim 132, wherein the groove
2 has an inner diameter in the range of about 0.0145 to 0.03 inches.

1 153. An intravascular balloon catheter as in Claim 132, wherein the groove
2 has an inner diameter in the range of about 0.016 to 0.02 inches.

1 154. An intravascular balloon catheter as in Claim 132, wherein the
2 elongate body is a catheter body.

1 155. An intravascular balloon catheter as in Claim 132, wherein the
2 elongate body is a guidewire.

1 156. A method for introduction of an intracorporeal device to an
2 intracorporeal body, comprising:
3 advancing a balloon structure as Claims 132 to an intracorporeal site over an
4 elongate member and receiving the elongate member at least in part within the balloon
5 structure axial groove.

1 157. A method for advancing an elongate body within an intracorporeal
2 body, comprising:
3 providing a balloon structure as Claims 132;
4 receiving the elongate body at least in part within the balloon structure axial
5 groove;
6 advancing the elongate body into the corporeal body.

1 158. A method for advancing a balloon structure within an intracorporeal
2 body, comprising:
3 providing an elongate body;
4 providing a balloon structure as Claim 132;
5 disposing the elongate body at least in part within the balloon structure axial
6 groove;
7 advancing the balloon structure and catheter body together within the
8 intracorporeal body; and
9 performing a therapeutic or diagnostic procedure.

1 159. A method for exchanging an elongate body from a balloon structure,
2 comprising:
3 withdrawing the elongate body in a proximal direction from a balloon
4 structure as in Claim 132; and
5 advancing a second elongate body along at least a portion of the axial groove of
6 the balloon structure in a distal direction within the intracorporeal body.

1 160. A kit comprising:
2 a catheter body;

a first balloon structure removably replaceable over the catheter body; and
instructions for use setting forth a method as in Claim 117.

161. A kit as in Claim 160, further comprising a second balloon structure.

162. A kit for treating an intravascular site, comprising:

a catheter body;

a first balloon structure removably replaceable over the catheter body; and

instructions for use setting forth a method comprising introducing the first
balloon structure into an intracorporeal lumen over the catheter body in a distal direction.

163. A kit for treating an intravascular site as in Claim 162, wherein the

instructions include introducing the first balloon structure over the catheter body in a distal
direction while the catheter body remains in place over a guidewire in the intracorporeal
lumen.

164. A kit for treating an intravascular site, comprising:

a catheter body;

a first balloon structure removably replaceable over the catheter body; and

instructions for use setting forth a method comprising introducing the first
balloon structure into an intracorporeal lumen; and introducing the catheter body into the first
balloon structure distally into the intracorporeal lumen.

receiving the catheter body.

165. A kit for treating an intravascular site as in Claim 162, 163, or 164,

further comprising a second balloon structure.

166. A kit for treating an intravascular site, comprising:

a first balloon structure as in Claim 132,

instructions for a method using the first balloon structure as in Claim 156.